



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,306	03/25/2005	Roger Guevremont	151-11 US/PCT	8638

25319 7590 07/03/2007
FREEDMAN & ASSOCIATES
117 CENTREPOINTE DRIVE
SUITE 350
NEPEAN, ONTARIO, K2G 5X3
CANADA

EXAMINER

MASKELL, MICHAEL P

ART UNIT	PAPER NUMBER
2809	

MAIL DATE	DELIVERY MODE
07/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/529,306

Applicant(s)

GUEVREMONT, ROGER

Examiner

Michael Maskell

Art Unit

2809

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) 21-38, 43, 47 and 48 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-12, 15-20, 39-41 and 44-46 is/are rejected.
- 7) ☒ Claim(s) 6, 13, 14 and 42 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 11/03/2005
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The abstract of the disclosure does not commence on a separate sheet in accordance with 37 CFR 1.52(b)(4). A new abstract of the disclosure is required and must be presented on a separate sheet, apart from any other text. The abstract that has been submitted consists of the first page of International Publication Number WO 2004/029614 A1. The abstract must be placed on its own sheet, without the drawings and other information that is on said publication.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 7, 9-12, 15-19 rejected under 35 U.S.C. 102(b) as being taught by Guevremont, et al (U.S. Patent Application Publication 2003/0150985 A1).

Regarding claims 1-4, Guevremont teaches an electrode stack having a length and comprising a plurality of electrodes, each electrode of the electrode stack being spaced apart from an adjacent electrode of the electrode stack in a direction along the length of the electrode stack, each electrode of the electrode stack having an edge defining a portion of an edge of the electrode stack, wherein the edge of each electrode of the electrode stack is approximately aligned with an edge of every other electrode of

Art Unit: 2809

the electrode stack so as to define the edge of the electrode stack, and wherein a spacing between any two adjacent electrodes of the electrode stack is approximately a same spacing, and wherein each electrode of the electrode stack comprises an electrode plate (121-125 in Fig. 4a); at least an electrode spaced apart from the edge of the electrode stack in a direction transverse to the length of the electrode stack, the space between the at least an electrode and the edge of the electrode stack defining an analytical gap for allowing ions to propagate therebetween (131 and 132 in Fig. 4a); and at least an electrical controller for electrically coupling to at least one of an electrode of the plurality of electrodes of the electrode stack and the at least an electrode, for applying an asymmetric waveform voltage between the electrode of the plurality of electrodes of the electrode stack and the at least an electrode and for applying a direct current voltage between the electrode of the plurality of electrodes of the electrode stack and the at least an electrode so as to establish an electric field within the analytical gap (Paragraph 0052).

Regarding claim 7, Guevremont teaches the apparatus according to claim 1, wherein the at least an electrode comprises an electrode plate having a length and being oriented so as to maintain an approximately uniform spacing along the length of the electrode plate to the edge of the electrode stack (131 and 132 in Fig. 4a).

Regarding claim 9, Guevremont teaches the apparatus according to claim 7, wherein the electrode plate is curved in a direction transverse to the length of the electrode plate (Fig. 5a, wherein the electrodes 151-155 are now considered the at least an electrode, and the electrode stack is now represented by the ion inlet and outlet

Art Unit: 2809

electrode plates 131 and 132 which are not shown in that figure, but are still located transverse to the electrodes 151-155; see paragraph 0064.).

Regarding claims 10-12, Guevremont teaches the apparatus according to claim 1, wherein the at least an electrode comprises a second electrode stack having a length, the length of the second electrode stack being substantially similar to the length of the electrode stack; wherein the second electrode stack comprises a plurality of electrodes, each electrode of the second electrode stack being spaced apart from an adjacent electrode of the second electrode stack in a direction along the length of the second electrode stack, each electrode of the second electrode stack having an edge defining a portion of an edge of the second electrode stack and the edge of each electrode of the second electrode stack is aligned with an edge of every other electrode of the second electrode stack so as to define the edge of the second electrode stack (131 and 132 in Fig. 4a).

Regarding claims 15 and 16, Guevremont teaches the apparatus according to claim 1, comprising an ion outlet plate disposed adjacent to a first end of the electrode stack and defining an ion outlet (136 in Fig. 4a) for extracting ions from the analytical gap, and an ion inlet plate disposed adjacent to a second end of the electrode stack opposite the first end and defining an ion inlet (135 in Fig. 4a) for introducing ions into the analytical gap.

Regarding claim 17, Guevremont teaches the apparatus of claim 15, comprising means for introducing ions into the analytical gap via a space between at least an

electrode of the electrode stack and an adjacent electrode of the electrode stack (Fig. 4b).

Regarding claim 18, Guevremont teaches the apparatus of claim 17, wherein the means for introducing ions into the analytical gap comprises an ion inlet (135 in Fig. 4a).

Regarding claim 19, Guevremont teaches the apparatus of claim 15, comprising a gas inlet for introducing a flow of gas into the analytical gap for carrying the ions in a direction towards the ion outlet (Paragraph 0069).

3. Claims 44-46 rejected under 35 U.S.C. 102(b) as being anticipated by Guevremont, et al. ("Atmospheric pressure ion trapping in a tandem FAIMS-FAIMS coupled to a TOFMS: studies with electrospray generated gramicidin S ions," J Am Soc Mass Spectrom 2001, 12, 1320-1330).

Regarding claim 44, Figure 6 of the Guevremont paper illustrate a method of separating ions comprising the steps of: introducing ions into a first space defined between adjacent electrode plates of a stacked parallel plate high field asymmetric waveform ion mobility spectrometer (the stack consisting of the common outer electrode and the inner electrode for side-to-side FAIMS); performing a first separation (by the sFAIMS) of the ions within the first space, to selectively transmit a subset of the ions along a first direction between a first end of the electrode plates (where the ions enter at the top) and a second end of the electrode plates that is opposite the first end (where the ions enter the tFAIMS); performing a second separation (by the tFAIMS) of the ions within a second space defined between the second end of the electrode plates and at

Art Unit: 2809

least another electrode (the tFAIMS inner electrode); to selectively transmit some of the subset of the ions along a second direction approximately transverse to the first direction between the second end of the electrode plates and an ion outlet (orifice plate).

Regarding claim 45, page 1326 paragraph 2 of the Guevremont paper teaches the method according to claim 44, comprising the step of providing a first flow of gas within the first space along the first direction between the first end of the electrode plates and a second end of the electrode plates and providing a second flow of gas within the second space along the second direction and toward the ion outlet.

Regarding claim 46, page 1326 paragraph 2 of the Guevremont paper teaches the method according to claim 44, comprising the step of providing a flow of a gas within the first space along the first direction between the first end of the electrode plates and a second end of the electrode plates; page 1324, paragraph 3 of the Guevremont paper teaches providing a potential gradient within the second space for directing ions propagating therein along the second direction toward the ion outlet.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5, 8, and 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Guevremont, et al (U.S. Patent Application Publication 2003/0150985 A1, hereafter

Art Unit: 2809

referred to as the '985 reference) in view of Guevremont, et al ("Atmospheric pressure ion trapping in a tandem FAIMS-FAIMS coupled to a TOFMS: studies with electrospray generated gramicidin S ions," J Am Soc Mass Spectrom 2001, 12, 1320-1330 hereafter known as "the paper").

The '985 reference teaches the apparatus of claims 1 and 7, but fails to teach wherein each electrode of the electrode stack comprises an electrode rod, and wherein the electrode plate is curved in a direction along the length of the electrode plate, comprising an ion outlet plate disposed adjacent to a first end of the electrode stack and defining an ion outlet for extracting ions from the analytical gap, comprising a gas inlet for introducing a flow of a gas into the analytical gap for carrying the ions in a direction towards the ion outlet, and wherein the gas inlet is disposed at a point that is more distal from the ion outlet relative to the ion inlet; however:

5. **Regarding claim 5**, the paper teaches an electrode stack having a length and comprising a plurality of electrodes, each electrode of the electrode stack being spaced apart from an adjacent electrode of the electrode stack in a direction along the length of the electrode stack, each electrode of the electrode stack having an edge defining a portion of an edge of the electrode stack (sFAIMS inner electrodes in Fig. 5); at least an electrode spaced apart from the edge of the electrode stack in a direction transverse to the length of the electrode stack (outer electrode in Fig. 5), the space between the at least an electrode and the edge of the electrode stack defining an analytical gap for allowing ions to propagate therebetween; and at least an electrical controller for electrically coupling to at least one of an electrode of the plurality of electrodes of the

electrode stack and the at least an electrode, for applying an asymmetric waveform voltage between the electrode of the plurality of electrodes of the electrode stack and the at least an electrode and for applying a direct current voltage between the electrode of the plurality of electrodes of the electrode stack and the at least an electrode so as to establish an electric field within the analytical gap (p. 1326, first and second paragraphs); wherein each electrode of the electrode stack comprises an electrode rod (sFAIMS inner electrodes in Fig. 5). Because the paper teaches all of the limitations of claims 1-5 (this is a 103 rejection only due to dependence on a claim already rejected with another reference under 102), it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus according to claim 1, wherein each electrode of the electrode stack comprises an electrode rod.

6. Regarding claim 8, the paper teaches an electrode stack having a length and comprising a plurality of electrodes, each electrode of the electrode stack being spaced apart from an adjacent electrode of the electrode stack in a direction along the length of the electrode stack, each electrode of the electrode stack having an edge defining a portion of an edge of the electrode stack (sFAIMS inner electrodes in Fig. 5); at least an electrode spaced apart from the edge of the electrode stack in a direction transverse to the length of the electrode stack (outer electrode in Fig. 5), the space between the at least an electrode and the edge of the electrode stack defining an analytical gap for allowing ions to propagate therebetween; and at least an electrical controller for electrically coupling to at least one of an electrode of the plurality of electrodes of the electrode stack and the at least an electrode, for applying an asymmetric waveform

voltage between the electrode of the plurality of electrodes of the electrode stack and the at least an electrode and for applying a direct current voltage between the electrode of the plurality of electrodes of the electrode stack and the at least an electrode so as to establish an electric field within the analytical gap (p. 1326, first and second paragraphs); wherein the at least an electrode comprises an electrode plate having a length and being oriented so as to maintain an approximately uniform spacing along the length of the electrode plate to the edge of the electrode stack (outer electrode in Fig. 5); wherein the electrode plate is curved in a direction along the length of the electrode plate (outer electrode in Fig. 5). Because the paper teaches all of the limitations of claims 1 and 7 (this is a 103 rejection only due to dependence on a claim already rejected with another reference under 102), it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus according to claim 7, wherein the electrode plate is curved in a direction along the length of the electrode plate.

Regarding claim 20, this paper teaches the apparatus of claim 15, comprising a gas inlet for introducing a flow of gas into the analytical gap for carrying the ions in a direction towards the ion outlet (curtain plate in Fig. 5 and p. 1326, paragraph 2, where it states "Nitrogen curtain gas was passed through a charcoal/molecular sieve gas purification cylinder and introduced into the region between the FAIMS common outer electrode and the curtain plate at a flow of 2.0 L/min."); wherein the gas inlet is disposed at a point that is more distal from the ion outlet relative to the ion inlet (the curtain plate is located just above the ion inlet; the gas flow enters the FAIMS through the same inlet

Art Unit: 2809

as the ions, therefore it is closer to the ion inlet than the ion outlet, because it is coincident with the ion inlet). Because the paper teaches all of the limitations of claim 1 (this is a 103 rejection only due to dependence on a claim already rejected with another reference under 102), it would have been obvious to one of ordinary skill in the art to provide the apparatus of these claims.

7. Claims 39-41 rejected under 35 U.S.C. 103(a) as being unpatentable over Fuhrer, et al. (U.S. Patent Application Publication 2001/0032929) in view of Guevremont (U.S. Patent Application Publication 2003/0150985 A1). Fuhrer teaches An apparatus for separating ions comprising:

an electrode assembly including; at least a first electrode comprising a first plurality of electrode portions (ring-shaped plate electrodes connected by resistors 16 in Fig. 8); at least a second electrode comprising a second plurality of electrode portions arranged in alternating sequence with the first plurality of electrode portions along a first direction (ring-shaped plate electrodes connected by resistors 18 in Fig. 8), wherein at least one of the first plurality of electrode portions and the second plurality of electrode portions is a portion of a formed electrode (the electrodes are formed into rings); but fails to teach an electrode plate spaced apart from the first plurality of electrode portions and the second plurality of electrode portions in a second direction transverse to the first direction, the space between the electrode plate and the first plurality of electrode portions and the second plurality of electrode portions defining an analytical gap for allowing ions to propagate therethrough along approximately the first direction; and, at

Art Unit: 2809

least an electrical controller for electrically coupling to at least one of the at least a first electrode, the at least a second electrode and the electrode plate for establishing an electrical field within the analytical gap resulting from the application of an asymmetric waveform voltage and a direct current voltage between the at least a first electrode, the at least a second electrode and the electrode plate, whereby ions having suitable high field mobility properties for a given combination of applied asymmetric waveform voltage and direct current voltage are selectively transmitted through the analytical gap.

However, Guevremont teaches an electrode plate spaced apart from the first plurality of electrode portions and the second plurality of electrode portions in a second direction transverse to the first direction, the space between the electrode plate and the first plurality of electrode portions and the second plurality of electrode portions defining an analytical gap for allowing ions to propagate therethrough along approximately the first direction; and, at least an electrical controller for electrically coupling to at least one of the at least a first electrode, the at least a second electrode and the electrode plate for establishing an electrical field within the analytical gap resulting from the application of an asymmetric waveform voltage and a direct current voltage between the at least a first electrode, the at least a second electrode and the electrode plate, whereby ions having suitable high field mobility properties for a given combination of applied asymmetric waveform voltage and direct current voltage are selectively transmitted through the analytical gap; further Guevremont teaches the apparatus wherein the electrode plate is a flat electrode plate (see 102 rejections above).

Fuhrer teaches the benefits of an alternating electrode stack arrangement in paragraph 0086, where it is taught that the first and second electrodes can either be separated by a different resistance to provide a high degree of focusing, or by a same resistance to provide high resolving power.

It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Fuhrer with those of Guevremont to apply at least a first electrode comprising a first plurality of electrode portions; and at least a second electrode comprising a second plurality of electrode portions arranged in alternating sequence with the first plurality of electrode portions along a first direction in Guevremont's ion mobility spectrometer apparatus (described in 102 rejections above). Doing so would allow the selection between high resolving power and high focusing.

Allowable Subject Matter

8. Claims 6, 13, 14, and 42 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Maskell whose telephone number is 571/274-3210. The examiner can normally be reached on Monday-Friday 8AM-5PM EST.

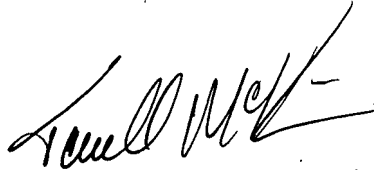
Art Unit: 2809

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrell McKinnon can be reached on 571/272-4797. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Michael Maskell
16 May 2007



TERRELL L. MCKINNON
SUPERVISORY PATENT EXAMINER